

REMARKS

Claims 1-43 remain pending in the application, in which claims 5, 9, 15-23, 25 and 27-43 are withdrawn from consideration. Applicant respectfully requests for allowance of claims 1-4, 6-8, 10-14, 24 and 26 based on following discussions.

Claim Rejections under 35 USC §112

Claims 1-4, 6-8, 10-14, 24 and 26 are rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, claim 1 is rejected because the recited element “neobydium” is not in the Periodic Table of Elements. In response, claim 1 has been amended by replacing “neobydium” with “niobium.” Such amended is supported by the specification, “[b]y the term ‘barrier layer-forming metal’ it should be understood to mean those metals and their alloys (such as Al, Mg, Ti, Ta, Zr, **Nb**, Hf, Sb W, Mo, V, Bi)...” on page 3, lines 16-17.

Claim 2 is rejected because it recites “wherein the group of metals further includes aluminium” whereas the group is described by closed language “consisting of” in claim 1 on which it depends. In response, claim 1 has been amended by replacing “consisting of” with “including at least.” Thus, the group as now described in claim 1 is open-ended.

Claims 13 and 14 are rejected because they describe no structural relationship between the “coating” recited in the preamble of claim 1 and the “metallic layer” recited in the body of claim 1. In response, claim 13 has been amended by adding the structural relationship as “wherein **the coating comprising the metallic layer and the sintered ceramic oxide layer** has a thickness less than 100um.”

As such, Applicant respectfully requests for withdrawal of the rejections to claims 1-4, 6-8, 10-14, 24 and 26 under section 112, the second paragraph.

Claim Rejections under 35 USC §102

Claims 1-4, 6 and 10 are rejected under 35 USC §102(b) as being anticipated by WO 02/088593, whose English counterpart is US Patent Application Publication No. 2004/0149759 to Moser et al. (hereinafter referred to as “Moser”)

Independent claim 1, as amended, is directed to a method of forming a coating on a plastics substrate comprising the steps of: applying a metallic layer to the plastic substrate wherein the metallic layer is selected from the group of metals including at least magnesium, titanium, tantalum, zirconium, niobium, hafnium, tin, tungsten, molybdenum, vanadium, antimony, bismuth, and alloys of the aforementioned metals; and subjecting the metallic layer to electrolytic plasma oxidation, wherein the metallic layer is anodically charged and immersed in an aqueous electrolytic solution for forming at least a sintered ceramic oxide layer on the metallic layer.

Moser fails to teach subjecting the metallic layer to “*electrolytic plasma oxidation.*” This is acknowledged by the Examiner on page 7 of the Office Action.

In the amended claim 1, the electrolytic plasma oxidation is articulated as “*wherein the metallic layer is anodically charged and immersed in an aqueous electrolytic solution for forming at least a sintered ceramic oxide layer on the metallic layer.*” Such limitation is not met by Moser. Although Moser teaches using a plasma process in forming a diffusion barrier, it is directed to a deposition from the gaseous

phase. *See, paragraph [0027]*. It fails to teach, suggest, or imply using an aqueous electrolytic solution in forming the diffusion barrier.

As such, Moser cannot anticipate claim 1 under section 102. Accordingly, claims 2-4, 6 and 10 that depend from claim 1 and include all the limitations therein are also patentable over Moser under section 102.

Claim Rejections under 35 USC §103

Claims 1-4, 6, 10 and 12-14 are rejected under 35 USC §103(a) as obvious over Moser in view of US Patent No. 5,811,194 to Kurze et al. (hereinafter referred to as “Kurze”).

In rejecting independent claim 1, the Examiner acknowledges on page 7 of the Office Action that Moser does not teach the claimed electrolytic plasma oxidation process. However, the Examiner asserts that Kurze teaches an electrolytic plasma oxidation process, and it would have been obvious for a person skilled in the art to combine Kurze with Moser, because Moser teaches an RF-based plasma process in forming an Al₂O₃ coating on the diffusion barrier. With all due respect, Applicant disagrees with the assertion.

It is not obvious to combine Moser with Kurze, because they teach away from each other. Kurze teaches a method of producing oxide ceramic coating on a metal layer using a plasma-chemical anodical oxidation process. *See, the abstract*. In the process, the metal layer is immersed in an electrolytic bath, and anodically charged to a high voltage. *See, col. 1, lines 19-36*. As a consequence, a partial oxygen plasma which forms the oxide ceramic layer is created at the phase boundary metal/gas/electrolyte. *See,*

col.1, lines 45-47. At the boundary, the plasma temperature can reach approximately 7,000° Kelvin, which is so high that the oxide ceramic is in liquid form. *See, col. 1, lines 50-53.* To the contrary, Moser's plasma process is intended to be carried out in a low temperature environment. As described in Moser, "[f]or deposition of a diffusion barrier layer..., the use of plasma-supported coating processes is particularly suitable since the substrate temperature can be kept lower..." *See, col. 3, paragraph [0037].* Given Moser's teaching, a skilled artisan seeking a technical solution in coating a ceramic layer on a plastic substrate would have looked away from any disclosures that required a high temperature coating process, as Kurze did. It is improper to combine references where the references teach away from their combination. *In re Grasselli, 713 F.2d 731, 743 (Fed. Cir. 1983).* As such, the combination of Moser and Kurze is improper, and therefore claim 1 is not obvious over them.

The claimed invention provides a solution in coating a ceramic layer on a plastic substrate that is recognized by neither Moser nor Kurze. Moser tries to avoid high temperature in its coating of diffusion barrier. This may be the reason that it does not mention electrolytic plasma oxidation at all. On the other hand, although Kurze teaches electrolytic plasma oxidation, it does not mention that such technique can be applied to coat a plastic substrate with a ceramic layer. It is the claimed invention that discloses that applying a metallic layer first on a plastic substrate could enable a subsequent ceramic coating through an electrolytic plasma oxidation process.

One of the benefits of the claimed invention is that the plastic substrate can be protected and strengthened by a ceramic coating with few pores. As described in the specification on page 3:

At temperatures of 7000K associated with the formation of the plasma, the ceramic oxide exists in a molten state. This means that the molten ceramic oxide can achieve intimate contact with the metal surface at the metal/oxide boundary, which means that the molten ceramic oxide has sufficient time to contract and form a sintered ceramic oxide layer with few pores.

As such, claim 1 is not obvious over Moser and Kurze under section 103. Accordingly, claims 2-4, 6, 10 and 12-14 that depend from claim 1 and include all the limitations therein are also patentable over the cited references under section 103.

Claims 7, 8, 11, 24, and 26 are rejected under 35 USC §103(a) as obvious over Moser in view Japanese Patent No. JP 54-31479, Russian Patent No. RU 2,026,890, *WU, Effect of Polishing Pretreatment on the Fabrication of Ordered Nanopore Arrays on Aluminum Foil by Anodization, J. Vac. Sci. Technol., Vol. B20(3), May/June 2002, pp. 776-782*, US Patent No. 6,655,937 to Hasert et al., and US Patent No. 4,647,347 to Schoener et al.

For the reasons discussed above, claim 1, as amended, is patentable over Moser under section 102, as well as Moser and Kurze under section 103. Accordingly, claims 7, 8, 11, 24, and 26 that depend from claim 1 and include all the limitations therein are also patentable over the cited references under section 103.

CONCLUSION

Applicant has made an earnest attempt to place this application in an allowable form. In view of the foregoing remarks, it is respectfully submitted that the pending claims are drawn to a novel subject matter, patentably distinguishable over the prior art of record. The Examiner is therefore, respectfully requested to reconsider and withdraw the outstanding rejections.

Should the Examiner deem that any further clarification is desirable, the Examiner is invited to telephone the undersigned at the below listed telephone number.

Applicant does not believe that any additional fee is due, but as a precaution, the Commissioner is hereby authorized to charge any additional fee to deposit account number 50-4244.

Respectfully submitted,

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